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A CASE OF METASTATIC CARCINOMA OF THE
CHOROID.¹

BY A. SCHAPRINGER, M. D., NEW YORK.

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Through the kindness of my friend, Dr. August Caillé, of this city, I recently had the rare good fortune of observing a case of one-sided metastatic carcinoma of the choroid occurring in a woman who had had primary carcinoma of the breast. After her death I secured the globe for microscopic examination.

Before describing the details of this case, it will not be superfluous to give a short résumé of all the cases of metastatic neoplasm of the choroid that have hitherto been recorded in literature. They are only five in number.

The first case was described in 1872 by Max Perls, the pathologist, then of Koenigsberg, and later of Giessen.² It was

¹A German translation of this paper will be found in the *New Yorker Medizinische Presse*.

²Virchow's Archiv, Bd. LVI, p. 437. ("Beiträge zur Geschwulstlehre.")

that of a laborer, 43 years of age, whose clinical history was that of pleurisy, combined with indefinite lung symptoms. In the clinical notes of the case no mention whatever is made of the condition of the eyes. The autopsy revealed primary carcinoma of the lungs and pleura with metastases in both choroids, as well as in different other organs. On making a microscopical examination of the choroidal tumors, Perls was able in several places to trace a connection between the tubules filled with epithelial cells and the capillary blood vessels, showing that the metastasis was due to capillary embolism.

It was fully ten years later when J. Hirschberg, of Berlin,¹ for the first time had the opportunity of recognizing *intra vitam* a metastatic tumor of the choroid. He gave a description of the ophthalmoscopic appearances, but a post-mortem examination could not be secured in this case. It was that of a woman who had suffered from a tumor of the right breast for nine years, when her eyesight began to fail, first on the right side and later also on the left.

A short time afterwards Schoeler, also of Berlin, published a similar case.² It was that of a woman, 33 years of age, who had suffered for six years from cancer of the left breast for which an operation had been performed six months before the intra-ocular metastasis made its appearance. When Schoeler exhibited the patient to the Berlin Medical Society, with the diagnosis of metastatic carcinoma of the choroid, both Hirschberg and Schweigger who were present and examined the woman, hesitated to admit the correctness of the diagnosis, because no differences of level in the fundus could be made out with the ophthalmoscope in the left eye, which was the special subject of examination. (In the other eye the background could not be seen on account of opacities in the vitreous.)

¹Verhandlungen der Berliner medicinischen Gesellschaft, Sitzung vom 8. Nov. 1885. Berliner klin. Wochenschrift, 1883, p. 75.—Centralbl. f. prakt. Augenheilk., 1882, p. 376.—Von Graefe's Archiv, XXX, 4, p. 114.

²Berliner klin. Wochenschr., 1883, p. 105 and 666.—Centralbl. f. prakt. Augenh., 1883, p. 236, 412, 534 and 536.

Schoeler admitted that no *prominence* could be seen, but insisted that there was a *diffuse* thickening of the choroid coat, as the refraction of the background had slowly changed from myopia $\frac{1}{36}$ or $\frac{1}{24}$ to hyperopia $\frac{1}{30}$. The optic disc showed considerable injection, and was surrounded by a greyish-white zone of 1 to 2 PD, gradually fading into the natural color of the background. There were several white patches and a great deal of disseminated pigment. Schoeler's diagnosis was corroborated by the microscopical examination of the eyes made by Uththoff after the death of the patient. Though the choroid presented a flat surface without any protuberances, sections placed under the microscope revealed the structure of carcinoma. This was the first case in which the results both of clinical observation and of anatomical investigation could be placed on record.

The fourth case was described by Hirschberg and Birnbacher.¹ A woman, 28 years of age, had had her right breast amputated on account of cancer on January 27, 1884, by Von Bergmann, who also removed several small metastatic nodules of the skin at the same time. The wound healed kindly, but nevertheless there was fever and the patient sank rapidly. The left eye had recently become blind; the patient could not tell exactly when. The diagnosis of metastatic carcinoma of the choroid was verified in this case also after death by the microscope.

The fifth and last case which I have been able to find in literature is that of Pflüger, of Bern.² Here the new growth was a sarcoma, not a carcinoma. A *nævus* situated on the side of the neck had undergone sarcomatous degeneration and formed the starting point of numerous metastases, one of which was found in the choroid of the right eye.³

¹Von Graefe's Archiv. f. Ophth., XXX., 4, p. 113.

²Arch. f. Augenheilkunde, edited by Knapp and Schweigger, XIV, 1

³After preparing this paper for the press, I learned through Vossius' newly published "Grundriss der Augenheilkunde," that Manz, of Freiburg, has also seen a case of metastatic carcinoma of the choroid after primary carcinoma of the breast. The original paper of Manz has not yet come within my reach.

The case observed by Dr. A. Caillé and myself was the following :

Mrs. M. H., æt. 51, a native of Germany, and a resident of New York, had been under the treatment of Dr. Caillé at different periods for the last ten years. Her symptoms were those of hyperæmia of the liver due to chronic constipation. She has had eight children, six of whom died in infancy or early childhood, but not under circumstances which would tend to corroborate a suspicion of syphilis. Between her seventh and eighth childbirth she had a miscarriage in the second month in consequence of an accidental injury. In the year 1880 she had varioloid. On October 6, 1885, Dr. Caillé, assisted by Dr. Ludwig Straus, amputated her right breast for scirrhus, and removed the axillary glands. Dr. Caillé also made a microscopical examination of the tumor, the anatomical structure of which proved it to be carcinoma. The wound healed by first intention. There was no subsequent return of the disease *in loco*.

Early in the month of August, 1887, or nearly two years after the operation, when accidentally covering her right eye with her hand, she discovered that the sight of the left eye was almost entirely gone. She could not see anything at all of objects lying in front of her, but could still notice things situated to the side. There was not the least change in the external appearance of the eye. Dr. Caillé happened to be in Europe at that time, and the patient consulted another physician who made an ophthalmoscopic examination, prescribed an internal remedy which was probably a solution of iodide of potassium, and atropia locally. About this time her strength began to fail noticeably and she looked cachectic. She became short of breath, especially when mounting stairs. When Dr. Caillé returned in the month of October, he found a considerable amount of fluid in the right pleural cavity. He suspected an intraocular metastatic tumor as the cause of the failure of sight in the left eye, and induced her to come to me for an ophthalmoscopic examination which was accordingly made on October 30, 1887.

The right eye was found to be normal in every respect. The left eye did not show anything abnormal at first sight, except that the pupil was somewhat enlarged and did not respond to light. The central part of the field of vision of this eye was entirely abolished, and so was the upper portion of the periphery. The rest of the periphery of the visual field was preserved so that objects brought into the lower, outer, and inner portion of the periphery of the field could be made out.

On ophthalmoscopic examination of this eye the media were found to be clear. Whilst the refraction of the normal portions of the background was emmetropic, the refraction of the surface of the optic disc was 1.0 D. The outlines of the disc were well defined, and there was a gradual transition from its prominence to the normal level of the neighborhood. The nervous tissue was quite transparent and the vessels were of normal calibre. There was no marked bend in the course of the vessels in the immediate vicinity of the papilla such as is seen in ordinary cases of papillitis. Whilst ordinarily only those portions of the retinal vessels lying within the physiological cup show parallax displacements, in this case the vessels running through the peripheric parts of the disc also exhibited such displacements. This was evidently due to the fact that a quantity of clear serum permeated the tissues of the optic disc and caused a considerable increase of the otherwise imperceptible difference of level of the blood-vessels.

In the region of the yellow spot, and its temporal vicinity, the color of the reflex of the fundus was much lighter than that of the rest of the background, instead of darker as in the normal. This reddish-white discoloration occupied an area having a diameter about four times the size of that of the optic disc and gradually faded into the normal color of the rest of the fundus except toward the optic disc which was not of normal refraction, as described before, and downward where there was detachment of the retina. The refraction of the discolored area was 3.5 D., which means that this region was elevated to the extent of about one millimeter above its nor-

mal level. A straight line, resembling somewhat in appearance a crack in a broken plate of glass, ran in a horizontal direction, beginning in the immediate vicinity of the outer border of the optic disc and ending in the region of the macula. The length of this line was about twice the diameter of the disc. This line could only be made out in the erect image and with a certain inclination of the ophthalmoscopic mirror. The reddish-white plateau of the region of the macula was permeated by a few thin blood-vessels between which and the regular retinal vessels no connection could be traced. Certain portions of the plateau appeared mottled owing to irregularly scattered pigment.

The lower periphery of the retina presented the usual picture of detachment by serous effusion, but the folding was not very marked, and the red color of the background shone through. The details of the detached portion could be examined with convex lenses of low power, proving that the retina had not yet removed to a great distance from its original position. Corresponding to this detachment of the lower portion of the retina, the upper part of the visual field was wanting as was the central part corresponding to the reddish-white plateau. The lower, outer, and inner parts of the visual field were preserved, as mentioned above.

Guided by the ophthalmoscopic appearances of the case in connection with the clinical history, I unhesitatingly diagnosed it as one of *secondary carcinoma of the choroid of the left eye*, thereby corroborating Dr. Caillé's surmise.

A small bony tumor about the size of a cherrystone could be felt on the patient's skull at a distant of $1\frac{1}{2}$ inch above and behind the right ear. It was not tender, and the scalp covering it was freely movable. She could not say exactly how long this tumor had existed.

On November 17, which was 18 days after my first ophthalmoscopic examination I visited the patient in order to assist Dr. Caillé in aspirating the right pleural cavity, and improved the opportunity by making a second examination with the ophthalmoscope before the operation was begun. The

straight line running from the optic disc towards the macula had disappeared.

The area of the elevated reddish-white field in the region of the posterior pole of the globe had increased in extent, and so had the irregular patches of pigment. The atypical blood vessels of the plateau had become more numerous. The central region of the plateau had a refraction of $+4.5$ D, or 1.0 D more than at the previous measurement and corresponding to an increase in thickness of about 0.3 mm. of the choroidal tumor supposed to be present. The disc showed some haziness. The detachment of the lower portion of the retina had extended on both sides.

About three pints of greenish-yellow serum were removed from the right pleural cavity by aspiration. No cancerous elements could be made out in this liquid by microscopical examination. On physical examination of the right side of the chest after the aspiration the symptoms of partial atelectasis of the lung were elicited. Besides, both sides presented the symptoms of bronchial catarrh, such as crepitant râles, rhonchi, but no absolute dulness on percussion. The patient complained from time to time of pains in the region of the liver, in the back, the right side of the chest, and in the left side of the forehead, but the pains were never very severe. She was very much annoyed, however, by incessant nausea and vomiting.

Two days after the aspiration of the fluid from the right pleural cavity, so much fluid had formed again that it reached the same height as before the tapping. The operative procedure was not repeated. The patient was sinking rapidly, and after having passed the last two months of her life lying constantly in bed, she died December 27, 1887.

The sight of her right eye was never impaired. The outward aspect, the mobility, and the tension of the left eye remained normal until the end, the only obvious abnormality being the dilatation of the pupil. During the last weeks the margin of the liver, which could be felt plainly on account of the great emaciation of the patient, stood about two inches

below the hypochondriac arch in the mammillary line. It was not nodulated.

The autopsy was not made with such completeness as would seem desirable on account of lack of time and other obstacles such as frequently hamper autopsies in private practice.

For these reasons the small tumor of the calvarium mentioned in the history of the case, the brain, the kidneys and the pelvic organs could not be examined. Dr. Caillé opened the thorax and the abdomen, and I enucleated the left eyeball.

There was a large amount of fluid in the right pleural cavity. The lower lobe of the right lung was adherent to the diaphragm and was permeated by a very large number of round cancer nodules. The other portions of the right lung, as well as the whole left lung, also contained such nodules, but here they were not quite so thick. The free surface of nodules which were situated at the periphery showed a central depression.

The liver was enlarged and hyperæmic. It contained a great number of nodules of the same description as those found in the lungs.

There were no nodules in either the stomach, the heart, or the pericardium.

I am indebted to Dr. J. I. Metzger for taking charge of the enucleated eyeball, and for making sections through it with the microtome.

The appearance of the nests containing epithelial cells in the sections of the choroid is strikingly similar to that observed in microscopical sections of scirrhous of the breast.

It is worthy of special note that the tension of the diseased eyeball had remained normal through the whole course of the disease.

Figure 10 represents a horizontal section of the left eyeball through the optic nerve entrance, seen from above and slightly enlarged. At the time of the last ophthalmoscopic examination the detachment of the retina had not yet involved this latitude. The anatomical examination of the eyeball showed that at the time of death the detachment had progressed to a

small distance above the yellow spot. The detachment involved only the portion of the retina lying to the outer side of

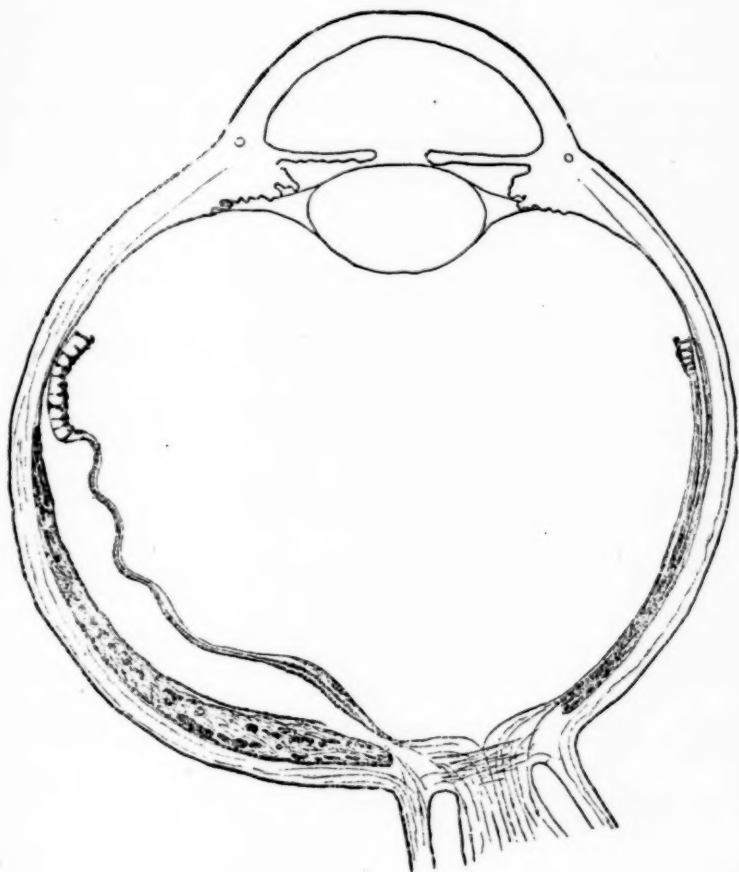


FIG. 10.

Horizontal section through the left eyeball.

the optic nerve entrance. At the *ora serrata* there is well marked cystoid degeneration, especially on the temporal or detached side. Except in the region of the macula lutea the several layers of the retina are well preserved, and can be eas-

ily distinguished everywhere, in the detached region as well as where the membrane is still adherent. The fact that the layer of rods and cones is still present in the temporal or detached portion of the retina proves that the detachment had only quite recently involved the meridian represented by the cut, as it is well known that this layer becomes rapidly disintegrated after detachment.

In the region of the macula lutea the retina is pervaded by small celled infiltration, and hence the differentiation of layers is obscured. A rent involving the whole thickness of the macula and present in the original section has not been reproduced in the cut, since it is evidently due to some accident in the preparation of the specimen. The optic nerve entrance and the small piece of the nerve attached to it show no abnormal tissue elements.

That portion of the section of the choroid which lies to the temporal side of the optic disc is markedly thickened and entirely transformed into carcinomatous tissue. The thickest portion of the new growth is that corresponding to the posterior pole of the eyeball, its diameter at this place amounting to somewhat more than double the thickness of the sclera at the same point. The thickness of the choroidal neoplasm becomes gradually less as we follow it up to the temporal side and at the region of the *ora serrata* it ends with a beveled edge. At the optic nerve entrance the outline of the border of the growth is rounded. The numerous black dots (Fig. 10) represent nests filled with epithelial cells, which can be seen more enlarged at G in Fig. 11.

The portion of the choroid situated on the nasal side of the optic disc is of normal thickness and structure, except a very small portion in the immediate vicinity of the nerve entrance, which is slightly thickened and shows a few epithelial nests in a row. (Fig. 10.)

The inner surface of the new growth is lined by the pigment layer (E, Fig. 11), which layer is now usually counted as the outermost stratum of the retina. In the region of the posterior pole of the eye, where the neoplasm is thickest, the pig-

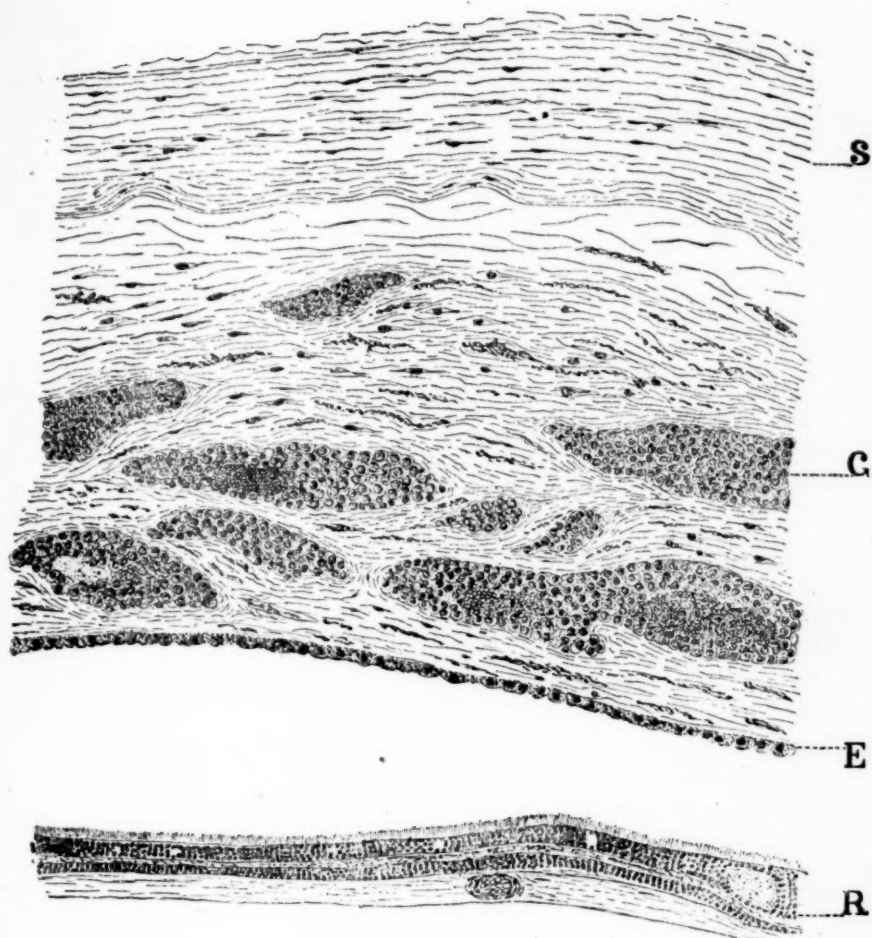


Fig. 11.

S=Sclera.

G=Carcinoma nests in the Choroid.

E=Pigment-pithelium.

R=Retina.

The drawing was made under a magnifying power of 1 : 100. In the reproduction this was subsequently reduced to one-third

ment epithelium is detached from it to some extent, and being reinforced by some newly-formed connective tissue, forms an independent black membrane which can be easily detached by macroscopic manipulation. (Fig. 10.)

The aspect of the new growth from the surface is just as flat as indicated by the cross section represented in Fig. 10. There is no nodule, prominence or protuberance anywhere. In order not to spoil the specimen I have hitherto omitted to determine the exact extent of the carcinoma above and below.

Fig. 11 represents a portion of the new growth from the region of the equator under a medium magnifying power. With a view of economizing space the distance between the detached retina (R) and the choroidal carcinoma (G) has been made a great deal smaller in the drawing than it actually appeared under the microscope. The sclerotic (S) is entirely normal. The new growth replacing the choroid (G) is composed of a firm groundwork of fibrillar connective tissue, containing numerous nests, replete with large epithelial cells. Besides these cells many nests contain also accumulations of red blood corpuscles. On the whole the area occupied by the connective tissue stroma predominates over that occupied by the cell nests in striking similarity to the microscopical appearance of scirrhous of the mammary gland, as said before. The stellated pigmentary cells, characteristic of the choroid, are also largely represented, especially in the outer layers of the neoplasm.

On the extreme right of Fig. 11 (at R) a single retinal cyst is seen in the early stage of development.

The great rarity of cases of metastatic neoplasms, compared with the relative frequency of primary malignant tumors of the choroid is in accord with the empirical law thus formulated by Virchow: "Those organs which show a great tendency to form protopathic tumors are rarely invaded by metastases."¹ I think, however, that the extremely small number of cases of metastatic carcinoma of the choroid hitherto observed does probably not represent the actual proportion of

¹Onkologie, I, p. 65.

their occurrence. If a metastatic tumor of this kind attacks one eye only, and does not cause any change in its external appearance, as in the case just stated, it is apt to remain undetected for a long time. The chances of its detection are also diminished by the fact that patients afflicted with metastatic cancers have only a short time to live.

The subject of this paper, though unquestionably of scientific interest, cannot claim much practical importance, but, I think, is not wholly devoid of the latter. It will be well to keep in mind the flat or diffuse nature of the tumor so nicely exemplified in this case as well as in that of Schoeler. It might cause undue hesitation, or even lead to error in diagnosis. Another point worthy of attention seems to be the following: Patients afflicted with failure of sight due to metastatic neoplasm of the choroid may not themselves be aware that they have cancer of some other organ. Hence, in every case where an intraocular tumor is diagnosticated or suspected, it will be the duty of the oculist to institute a thorough search for a possible primary tumor.

The question whether metastatic carcinoma of one eye is propagated to the other by way of the optic nerve and chiasm is still an open one. Even if further observations should establish this "migratory" tendency of metastatic carcinoma of the eye beyond doubt, prophylactic enucleation will hardly ever be urged in order to save the other eye, since the patients of the class under consideration, being afflicted with metastases in other organs, have only a short lease of life anyhow:

IS ASTIGMATISM A FACTOR IN THE CAUSATION OF GLAUCOMA?

BY SAMUEL THEOBALD, M. D.

Surgeon to the Baltimore Eye, Ear and Throat Charity Hospital.

(A paper read before the American Ophthalmological Society, Congress of
Physicians and Surgeons, Washington, September 19, '88).

Before entering upon the consideration of the subject proper of this paper, I wish, by way of preface, to state my conviction, based upon somewhat extensive observation, that in astigmatism the direction of the meridians of greatest and least refraction determines, to a very marked degree, the amount of the asthenopia and other ill consequences which usually attend this form of ametropia. That is to say, an astigmatism in which the meridian of least refraction is vertical or nearly so, will, as a rule give rise to very much more trouble—more asthenopia, more headache, and a greater likelihood of pathological changes occurring in the eye—than will one of equal or even greater degree in which the meridian of least refraction is horizontal, or nearly so. What the explanation of this fact is, I am not prepared to say, unless it be, as seems altogether probable, that the former variety of astigmatism is a wider departure from the normal or emmetropic eye than the latter, and for this reason the eye is more intolerant of it, and endeavors more actively and more persistently to overcome it. There can be no question, of course, that the latter variety—in which the meridian of lowest refraction approaches the horizontal—is the more common; and, in my own mind, there is as little question that the non-asthenopic astigmatic eyes, which we all recognize as being by no means rare, belong almost

wholly to this group. On the other hand, experience has convinced me that when the boundary line is over-stepped to even a very small degree, when there is the slightest amount of what has been correctly termed "astigmatism against the rule,"—that is astigmatism in which the lowest refraction is vertical or nearly so—asthenopic symptoms are almost sure, sooner or later, to make their appearance.

So fully convinced am I of the correctness of this view, that my practice in dealing with astigmatic cases has been for some time influenced by it. For example, if I find in an asthenopic patient even a quarter-dioptre of astigmatism of this unusual variety, I feel that I have discovered a satisfactory explanation of the symptoms, and I prescribe glasses for the correction of this slight error of refraction, with the utmost confidence that they will give decided relief. If, on the contrary, with so small an amount of astigmatism as this, the meridian of lowest refraction be about horizontal, I hesitate to decide that it is the true cause of the asthenopia, and, if I order correcting glasses, it is not without misgivings as to the result.

Another characteristic of this—as I am sometimes disposed to call it—topsy-turvy astigmatism is that for some reason—perhaps, because the effort to accomplish it is more persistent than in the commoner variety—the eye seems to be capable in an eminent degree of hiding it away, so to speak, of rendering it latent through the action of the ciliary muscle upon the lens, so that its detection and its correction by means of glasses are more than usually difficult; and, when we have prescribed such lenses as seem to be indicated, we can never feel sure that there is not an additional portion which we have been unable, even by liberal use of a mydriatic, to render manifest, and which we shall eventually have to take into account. Still another of its peculiarities is that, even though it be of very low grade, relief from the asthenopic symptoms which it induces is seldom obtained unless the correcting glasses be worn constantly—in distant as well as in near vision; a fact which I invariably take into account in directing how the glasses shall be used.

Lastly, I may add that by far the greater number of pronounced cases of choroido-retinitis from accommodative strain that I have met with, have been associated with this variety of astigmatism; and in view of this experience I need hardly say—and this brings me back to my proper subject—that I have attached more significance to the cases of glaucoma associated with astigmatism which I have met with, and have been less disposed to regard the co-existence of the two as accidental, because, in almost every instance, the astigmatism has proved upon examination to be of this troublesome sort.

I shall not, in this paper, attempt to discuss the almost innumerable theories of the etiology of glaucoma which have been advanced from time to time. It is, perhaps, safe to say that no one of them contains the whole truth, and that most of them are not wholly at fault. When our knowledge of the subject becomes more complete, we shall doubtless be able to draw a much broader distinction than we now do between the very different conditions which, at present, are grouped under the common name of glaucoma, and then we shall probably learn that these different conditions are by no means to be traced to a common cause. Even with our present imperfect knowledge, I think we are justified in believing that in most cases there are two factors which have to do with bringing about the glaucomatous condition: first, a defect or inadequacy in the drainage apparatus of the eye, which it is likely may be either congenital or acquired, and which must be regarded as the predisposing condition, and, second, an excessive formation of fluid in the posterior chamber of the eye, which probably may be brought about in a variety of ways, and which is to be looked upon as the immediate or exciting cause.

Among the conditions which have been suggested as capable of producing such an undue formation of fluid in the vitreous chamber, hyperæmia of the ciliary body and choroidal coat occupies a prominent position. Now, if there be an anomaly of the eye better qualified to produce this condition of hyperæmia, or which, so far as the ophthalmoscope indi-

cates, does more systematically produce it, than astigmatism—and particularly that variety of astigmatism upon which I have laid especial stress—it has not been my fortune to meet with it. It is in this way, then, that I believe astigmatism acts as a factor in the causation of glaucoma. (As bearing upon this view it is well to recal how often attacks of glaucoma are brought on by prolonged accommodation strain, from undue use of the eye in reading, writing, etc.)

The cases which I shall briefly refer to as sustaining this view, I realize, are not numerous enough or of such a character as to afford conclusive evidence; but, they are, at least, suggestive, and deserve, I think, not to be dismissed without consideration. Perhaps the list would have been longer if the subject had not so recently attracted my attention. With but two exceptions they have all been observed with the last twelve months, and all but one have occurred in my private practice. As will appear, they are of two classes, first, cases of pronounced glaucoma in which astigmatism was found to be present, and, second, cases of astigmatism in which there were discovered signs at least suggestive of a threatening of glaucoma. To me, they have seemed of such significance that in future, whenever I encounter a case of glaucoma, not so far advanced as to render such an examination out of the question, I shall feel that I have not done my whole duty until I have carefully tested for the existence of astigmatism and have accurately corrected any appreciable amount of it which the test may have shown to be present.

CASE I. Mr. P., age 49. L. eye, chronic glaucoma, with posterior polar lens opacity. When first seen, V. of L. eye was $\frac{20}{LXXX}$; V. of R. eye, $\frac{20}{XXX}$ (?). L. eye + T1; R. eye + T1 (?). Has suffered with neuralgic pains in temples, especially on left side. Ah. $\frac{1}{24}$ was found to be present in the L. eye, Ah. $\frac{1}{36}$ in the R. eye, the meridian of lowest refraction being exactly vertical in the former, and at 85° in the latter. Correcting glasses were prescribed (Feb. 16, 1888), which brought the V. of the L. eye up to $\frac{20}{XLV}$ (?), and that of the R. eye to $\frac{20}{XV}$ (?). Subsequently an iridectomy was performed upon the L. eye.

Notwithstanding this, however, the glaucoma has progressed in this eye, but the R. eye has done well. When last seen (Sept. 10,) the media of the L. eye were misty, and its $T+1$. The R. eye, with his astigmatic glass, which he has worn constantly, had, by a very poor light, $V=^{20}/_{XX}$ (?); exhibited no changes in the fundus suggestive of glaucoma; and had Tn .

CASE II. Mr. J. P., about 75 years of age. R. eye, absolute glaucoma, with secondary cataract; absence of light perception; intermittent ciliary neuralgia; $+T2$. L. eye $+T1$ (?), with slight contraction of nasal half of visual field, and $V=^{20}/_C$ (?). Examination, revealed compound Ah. in this eye, lowest refraction nearly vertical. Patient declined operation. Prescribed eserine, and for the L. eye ordered $+^{1}/_{72}$ c axis 35, combined with $+^{1}/_{36}$ s for distant, and with $+^{1}/_{8}$ s for near vision. The former improved V to $^{20}/_{XLV}$.

CASE III. G. H., age 74. Chronic, non-inflammatory glaucoma. R. eye $+T1$ (?); V =light perception. L. eye $+T1$ (?). Found in the L. eye compound Am. lowest refraction vertical. Prescribed spectacles for constant use, R. eye, plain glass; L. eye $-^{1}/_{72}$ c ax. 90° , which left $M=^{1}/_{15}$ uncorrected; but, this was convenient for his work (varnishing furniture), and was sufficiently satisfactory to him in distant vision. In spite of the glass, however, and the systematic use of eserine, his V. with correcting glass has declined slightly, from $^{20}/_{XL}$ (?), in January last, to $^{20}/_{LX}$ on August 15.¹

CASE IV. Mrs. C., age 61. R. eye, absolute glaucoma; $+T2$, with intermittent attacks of pain, notwithstanding, she had previously submitted to the performance of an optico-ciliary neurotomy upon this eye. In the L. eye, which exhibited symptoms of incipient glaucoma, compound Am. was found to be present, the meridian of lowest refraction in this instance being horizontal. Correcting glasses were prescribed—for distance, L. eye $-^{1}/_{20}$ s $\ominus -^{1}/_{60}$ c axis 180° ; for reading $+^{1}/_{72}$ s $\ominus +^{1}/_{60}$ c axis 90° ; these gave $V=^{20}/_{XL}$ (?), and J. No. 1 with

¹At a subsequent visit (Oct. 7) V. was brought up to $^{20}/_{X1}$ (nearly) by increasing the strength of the cylinder to $-^{1}/_{36}$, and combining with it a spherical glass to correct the myopia.

difficulty. The subsequent history of the case is not known.

Three other cases of astigmatism associated with glaucoma have recently come under my observation, but, as two of them were not seen, and the refraction of the other was not tested, until after the eyes had been iridectomized, and it is very possible the astigmatism may have been due to the operation, they do not deserve to be cited in the connection.

The cases which follow are examples of asthenopic astigmatic eyes in which, although glaucoma did not actually exist, there were present symptoms, which, at least, were suggestive of its imminence.

CASE V. Mr. B., age 52, merchant. Asthenopia of long standing. Ah. $\frac{1}{72}$ in L. eye, lowest refraction at 60° ; Ah. $\frac{1}{72}$ in R. eye, lowest refraction at 135° . Anterior chambers very shallow; +TI (?) in each eye; suspicious cupping of both discs. Glasses both for near and distant vision were prescribed, and the asthenopic symptoms were promptly relieved.

CASE VI. Mrs. M. B. Compound Ah. $\frac{1}{60}$ in one eye, lowest refraction at 100° ; Ah. $\frac{1}{72}$ in other eye, lowest refraction at 145° ; presbyopia; asthenopia. Each eye had +TI (?), and each disc was hyperæmic and suspiciously cupped. There was also in each eye an easily detected venous pulse.

CASE VII. Mrs. F., age 43. Asthenopia and headaches of long standing. Ah. $\frac{1}{18}$ in L. eye, lowest refraction at 33° ; Am. $\frac{1}{144}$ in R. eye, lowest refraction at 15° ; optic discs very hyperæmic. The more astigmatic (L) eye showed a marked pulse in the larger retinal veins; in the other eye the pulse was perceptible, but much less marked.

CASE VIII. Mrs. T., age 47. Hypermetropia of high grade in L eye; compound Ah. (H of high grade) in R. eye, meridian of lowest refraction nearly vertical (at 105°); asthenopia and headaches of long standing. The astigmatic eye exhibited a well marked venous pulse, which was not present in the fellow eye. The T of each was above normal.

CASE IX. Miss D., age 40. Compound Ah. $\frac{1}{36}$ in each eye, lowest refraction about horizontal; asthenopia of long

standing, more pronounced in L. eye. In the L. eye there was a very distinct venous pulse, and a suspicious cupping of the optic disc. In the R. eye the disc was hyperæmic, but not cupped, and there was no venous pulse. Tn. in each.

CASE X. Mrs. K., age 35. Ah. $\frac{1}{72}$ in R. eye; compound Ah. $\frac{1}{144}$ in L. eye, lowest refraction nearly horizontal in each; asthenopia, chiefly in more astigmatic (R) eye, and headaches. The optic disc of the R. eye was extremely hyperæmic, and exhibited a suspicious cupping, which was not present in the other eye. There was also in R. eye a well-marked venous pulse. Patient said she had often seen a halo about candle-flame.

CASE XI. Mrs. S., age 33. Marked anisometropia; Am. $\frac{1}{18}$ in R. eye; M. $\frac{1}{20}$, with Am. $\frac{1}{60}$, in L. eye, lowest refraction about horizontal in each; persistent asthenopia, in spite of previously prescribed astigmatic glasses. Each eye showed a suspicious cupping of the disc.

CASE XII. Mrs. L., age about 38. Asthenopia of long standing. M. $\frac{1}{20}$, with Am. $\frac{1}{16}$ in R. eye, lowest refraction nearly horizontal; Ah. $\frac{1}{36}$, lowest refraction nearly vertical (at 85° ;) in L. eye. Well marked choroido-retinal changes at posterior pole of R. eye, with numerous floating opacities in vitreous. Smaller and less numerous opacities in vitreous of L. eye. Has attacks of pain from time to time in L. eye and left side of face and head, and has observed a halo about candle flame. While under observation the left disc became somewhat cupped, and a venous pulse became established in this eye. The T, however, was never found appreciably above normal in either eye, and the sight of the L. eye remained good. The astigmatism was corrected; small doses of biniodide of mercury, with iodide of potassium, were given, from time to time, for long periods, and pilocarpine (gr.ij to 5j) was applied to the eye; and gradually the glaucomatous symptoms, including the venous pulse, disappeared, and when the patient was last seen a period of six months had intervened without any signs of a relapse.

EXCESSIVE INTRA-OCULAR HÆMORRHAGE
AFTER CATARACT EXTRACTION, FOL-
LOWED BY ENUCLEATION AND LOCA-
TION OF THE HÆMORRHAGE IN
THE RETINA.

BY DR. A. PROUDFOOT,

Prof. of Ophthalmology and Otology, University of Bishops College, Montreal,
Specialist for the Diseases of the Eye, Ear and Throat, Western Hospital,
Infants Home and Montreal Dispensary, Life Member of the British
Association for Advancement of Science, etc., etc.

June 5th 1883, I was consulted by G. J., a large full-blooded man of about 50 years of age, for loss of sight in the left eye, which I found to be due to a mature cataract.

The patient being desirous of having it removed, the operation was performed without an anæsthetic.

A small peripheral incision was made with a Graefe's knife and the cataract (which was rather small) removed *without iridectomy*.

The pupil was clear though slightly irregular at its upper margin; but the operation was satisfactory in every respect. The anterior chamber, however, soon filled with blood, and I found it impossible to arrest the hæmorrhage. I therefore applied the bandage pretty tightly in the usual way and put the patient to bed. At 9 P. M., very little pain was complained of; but the compress and bandage covering the eye were saturated with blood. These were removed and a fresh bandage applied.

June 6th. The dressings still saturated with blood, the patient has complained of some pain and is very restless. On examining the eye there is a small clot of blood between the edges of the lids; and the lips of the incision are widely separated by a large piece of vitreous, which projects from between

them. This was removed with curved scissors and the edges of the wound carefully brought together; atropine was dropped into the eye and the dressings again applied.

June 7th. The patient has suffered a good deal of pain during the night, and was forced to sit up several times upon a chair, in which position he seemed to get some relief.

The dressings were again found to be stained by a bloody discharge and the lids and conjunctiva were considerably swollen. The eye was thoroughly bathed with a solution of boric acid, atropine dropped into the eye and the dressings re-applied. At 9 P. M. renewed the dressing and ordered a pill of $\frac{1}{4}$ gr. morphia sulph. to be taken every night to relieve pain and secure sleep.

June 11th. Up to this time the inflammation has been very severe, and the patient's suffering have only been relieved by hot fomentations and morphia.

The whole of the vitreous has escaped, and the anterior chamber and edges of the incision are filled with lymph.

June 12th. The inflammation is now rapidly subsiding.

June 16th. At the urgent request of the patient (who was anxious to return to his business) I enucleated the eye, and by the 23d of June he was well enough to attend to his affairs. From this on he made a rapid recovery.

On making a transverse section of the globe immediately after its removal, it was found to be filled by thick discolored lymph; a small clot was discovered near the disc, which upon being removed disclosed a rupture of a small branch of the arteria centralis, which was evidently the seat of the hæmorrhage. When examined with a strong glass, a small dilatation of the vessel was found to exist at the point of rupture.

Dr. B. E. Fryer, of Kansas City, has recently published a case of excessive hæmorrhage after cataract extraction and stated that "in all probability the source of the hæmorrhage was from the stump of the iris."

Dr. F. C. Hotz, of Chicago, Ill., has reported two cases, but considers it likely that the hæmorrhage was from behind the

vitreous in the choroid or retina, and quotes Dr. Albert Mooren in support of his opinion.

My case differs from those reported by the gentlemen whom I have mentioned in the following points, viz.,

1. The operation was performed without an anæsthetic.
2. The cataract was removed without iridectomy.
3. The hæmorrhage was at no time very profuse, though it lasted for three or four days.
4. The eye was removed on the 11th day after the operation and the hæmorrhage definitely located in the retina.

This is the only case of the kind that has fallen under my observation in an experience of nearly twenty years.

The man was very full-blooded and evidently addicted to the excessive use of stimulants. He was the proprietor of a small hotel.

In all such cases the operation should be made so as to allow the aqueous to flow off as slowly as possible, in order that the equilibrium of the circulation within the eye may not be too rapidly disturbed.

AMERICAN OPHTHALMOLOGICAL SOCIETY.

SPECIAL MEETING, SEPTEMBER 19, 1888.

MORNING SESSION.

DR. HENRY W. WILLIAMS, OF BOSTON, PRESIDENT PRO TEM.

DR. DAVID WEBSTER, of New York, read a paper on
SOME TENOTOMIES FOR THE CORRECTION OF HETEROPHORIA,
WITH RESULTS.

He reported forty cases; twenty-five had been operated on but once; in sixteen a second operation was done, and three had previously been operated on by others, making a total of sixty tenotomies. The operations had been done since the beginning of July, 1886. The method was that described by Dr. G. T. Stevens, except that the tendon was always entirely divided. A slight over-correction was usually aimed at and attained. In three cases a slight reduction of the effect was necessary. In a single case he regretted having operated. All operations were done under cocaine, and the eyes tested from time to time, to determine when sufficient effect had been produced.

Among these cases there were four epileptics, none of whom were cured; in one there was a temporary suspension of the fits, and in another they were thought to have been favorably modified. There were two cases of chorea, both of which seemed favorably influenced. In three hysterical males remarkably good results were obtained. Most of the operations were done for headache and asthenopia. The writer had reached five conclusions, viz: That no person should have a tenotomy done for heterophoria, without inconvenience probably due it; very slight degrees may cause trouble, and should be attended to. All other methods should be tried before

tenotomy. The operation should be performed under cocaine, and the eyes from time to time tested to guard against over-correction, and that in properly selected cases, the results are quite as good as are obtained by most other surgical procedures.

DR. SAMUEL THEOBALD, of Baltimore, read a paper (see p. 298, this issue) entitled.

IS ASTIGMATISM A FACTOR IN THE CAUSATION OF GLAUCOMA ?

He was convinced that the direction of the meridians of greatest and least refraction determines to a marked degree the amount of asthenopia, etc., attending this form of ametropia. When the meridian of lowest refraction is vertical or nearly so, the asthenopia, headache, and likelihood of pathological changes in the eye are greater than when it is horizontal or nearly so. The slightest degree of astigmatism of this character almost always gives rise to trouble, and if it amounts to not more than 0.25 D., requires to be corrected. The non-asthenopic astigmatic eyes are rarely of this sort, but cases in which the meridian of least refraction approaches the horizontal. Astigmatism in which the meridian of least refraction approaches the vertical are less common, and must be regarded as the wider departure from emmetropia. Because of a more persistent effort of the ciliary muscle to correct it, this form is more difficult to detect; and it will not all be revealed at a first examination, even by the aid of a mydriatic. The writer found this variety of astigmatism in almost every instance associated with glaucoma, so that he was disposed to regard the association as not accidental. Hyperæmia of the ciliary muscle is a common result of astigmatism, especially of this form. This would induce an undue flow of fluid into the vitreous, and if the anterior drainage apparatus happened to be inadequate, a glaucomatous condition would result. Cases of glaucoma with astigmatism of this form, and of astigmatism mostly of this form with threatened glaucoma were related.

DR. PETER A. CALLAN, of New York, read a paper on the
TREATMENT OF ULCERS OF THE CORNEA.

The ulcers occurring in young persons and children are really phlyctenulæ of the cornea, or neglect of lid friction causing absorption gives rise to an ulcer. The treatment is yellow oxide of mercury salve (two to ten per cent.) placed between the lids once daily; atropia and cocaine if necessary; tonics; open-air exercise; regulation of diet; airy sleeping quarters; smoke-glasses; avoidance of dark room or bandages. The ulcers due to conjunctivitis need no special treatment other than that for the disease causing them. In gonorrhœal ophthalmia, ophthalmia neonatorum, or granular lids, we always redouble our efforts when the cornea is likely to become involved; cutting the canthus, applying leeches or ice, etc. He referred especially to ulcers occurring without apparent cause due to some constitutional trouble, malaria, syphilis, etc. For these give the remedy for the constitutional ailment, and locally cocainize the eye thoroughly, and clean the ulcer with a piece of absorbent cotton wrapped on a holder, and with the same as an applicator swab the ulcer, leaving no part of it untouched, with a two per cent. solution of silver nitrate. This may have to be repeated two or three times in the course of as many days. Bathe the eye with hot water, (120° to 130° F.) three times daily for a half-hour. If much corneal irritation exists, bathe with boric-acid solution, and use atropine and cocaine after each bathing. The point is to get a clean wound; and silver nitrate, besides stimulating repair, is a safer, better means of doing this than any other known to the writer.

AFTERNOON SESSION.

DR. EDWARD JACKSON read a paper entitled
MERIDIONAL ASTIGMATISM.

By this name was designated the defect of the eye which caused a difference between the refraction of the eye at the

centre of the pupil, and the refraction at the pupillary margin. It is to be detected and studied by the shadow-test, with which it causes an erect image and an inverted image of the light area to be seen in the pupil at the same time; one at the centre of the pupil, the other at its margin. His deductions of practical interest were that it was the lower degrees of the defect that were most likely to interfere with vision; that it was a cause of different refraction in the eye with a contracted pupil from that of the same eye under a mydriatic; and that it was especially apt to cause symptoms of asthenopia in those whose complaints were chiefly connected with near work or exposure to bright light.

The committee, composed of Drs. Edward Jackson, Henry D. Noyes, and Swan M. Burnett, appointed to consider the

PROPOSITION TO DESIGNATE PRISMS ACCORDING TO THEIR
REFRACTIVE POWERS,

recommended the indorsement of the following propositions:

1. Prisms ought to be designated by the number of degrees of "minimum deviation" they produce.
2. Where intervals of less than one degree are desired, half-degrees and quarter-degrees should be used.
3. To indicate that degrees of deviation are meant, the letter "d." shall be added. Thus, "prism 2°d." will indicate a prism that produces a minimum deviation of two degrees.

DR. J. OSCROFT TANSLEY, of New York, exhibited and explained.

A NEW INSTRUMENT FOR DEMONSTRATING REFRACTION,

consistment of a box with glass sides, with a magic-lantern attachment, and arranged for the adjustment of various lenses. The box was to be filled with smoke, in which the courses of the rays from the lantern would be quite plainly visible.

DR. W. F. MITTENDORF, of New York, reported three cases of

ACUTE COCAINE CONJUNCTIVITIS.

It was to be expected that idiosyncrasy, such as constitutes a bar to the use in certain cases of other drugs, would be found to exist with reference to cocaine. These cases occurred after the use of a four per cent. solution of the drug, and were characterized by swollen, shiny lids, and a profuse acrid discharge. Two of the cases occurred in elderly women and the third in a man. In one of the women, after relief had been obtained by cessation of the use of the drug, a renewal of its use was promptly followed by a renewal of the trouble. In the man three separate attacks were caused at different times by different applications of the drug. It is likely that the condition is due to a paralyzing effect of the drug on the terminal sympathetic nerve filaments.

DR. S. M. BURNETT, of Washington, exhibited some.

APPARATUS FOR DIAGNOSIS OF REFRACTION.

This consisted of a disk of lenses to be used in applying the shadow-test, arranged to be fixed to the wall and adjustable to any height, and readily used for either eye, or swung out of the way when not in use.

DR. CARL KOLLER, of New York, read by invitation a paper on

BLEPHAROSPASM.

Although this is only a symptom, it is an important one. Cases might be divided under three heads; viz., the neurotic, the hysterical, and those in which it was a reflex of irritation of the nerve-endings of the cornea and conjunctiva. The latter included the cases of phlyctenular disease. Cocaine, from which he had at first hoped much, had proved useless, exerting but a slight influence when very freely applied. An essential factor in the continuance of the spasm is a fissure that forms at one canthus, usually the outer, making a condition resembling fissure of the anus. The cure here may be effected by division of the muscle, but this is not usually neces-

sary. Treatment of the conjunctival condition, cauterization of the fissure with copper sulphate, and the application of the of the ointment of yellow oxide of mercury are commonly sufficient.

DR. H. DERBY, of New York, reported a case of

MONOCULAR OPTIC NEURITIS,

in which the swelling of the papilla at one time reached seven dioptrics, and light—perception was lost. Under large doses of potassium iodide, and mercurial inunctions, the swelling had been greatly reduced and vision had returned and improved to seven-tenths.

DR. O. D. POMEROY, of New York, reported five cases of

REMOVAL OF THE DISLOCATED CRYSTALLINE LENS WITH THE
BIDENT.

This instrument, proposed by the late C. R. Agnew, had proved a very satisfactory aid in the hands of the few who had tried it. In all these cases good vision was obtained. Care must be taken not to press the lens too far forward with the bident, and it must be extracted with a scoop or sharp hook.
—*The Med. Rec.*

CORRESPONDENCE.

A SPELL OF PTERYGIUM.

Having had occasion to look over a great many medical certificates of confreres, I was struck by the bold privateering spirit prevailing to a large extent, in the method of spelling many quite ordinary and simple words. From among them I selected the word pterygium, which may be classified as an ordinary word in medical literature, and have carefully transcribed and preserved every deviation for the commonly accepted method of constructing this word.

Pterygium is not a hard word to spell correctly and the struggle for originality in many of these efforts is worthy of a better cause. Each one of the vagaries which I present below is the product of a "Board" of three regular practitioners of medicine, is duly signed and sent to one of the Government Departments in Washington.

It will, doubtless, be questioned whether all of these coruscations are designed to be synonyms for pterygium. I confess that, at first glance, I failed in many instances to recognize this word, so ingeniously was it concealed in reduplications and unusual initial letters. In all doubtful cases, however, I verified my suspicions by a careful study of the context.

I hope this communication will prove of interest to the advocates of higher preliminary education for physicians. I make no attempt to classify my list, but put the words down in the order in which I captured them:

Ptyterigium,	Terigium,	} Plural forms.
Ptyrigion,	Terygerum,	
Phrygium,	Ptyrrigim,	
Pteerygiam,	Pterregium,	
Ptyrigium,	Teryguim,	
Turgeum,	Pterygum,	
Tergeum,	Pterygrum,	
Purygium,	Sterygium,	
Pteregium,	Pteryrigium,	
Ptyregium,	Ptrygium,	
Terrigeum,	Pterygima,	
Pterygium,	Ptegruggie,	
Ptererygium,	Ptrygii,	
Pterigium,	Pterygion,	
Pteygium,	Ptergium,	
Styrrigium,	Ptreygium,	
Pterrigum,	Ptregyium,	

THOS. FEATHERSTONHAUGH, WASHINGTON, D. C.

EDITORIAL NOTICE.

We have received the second annual announcement of systematic courses in ophthalmology and otology by the attending surgeons of the Illinois Charitable Eye and Ear Infirmary, corner West Adams and Peoria Streets, Chicago, Illinois.

FACULTY.

Professor Emeritus, Edward L. Holmes, M. D.

Professor Ferd. C. Hotz, M. D., President, Operative Surgery of the Eye.

Professor Lyman Ware, M. D., External Diseases of the Eye.

Professor Wm. T. Montgomery, M. D., Treasurer, Internal Diseases of the Eye and the Ophthalmoscope.

Professor Edwin J. Gardiner, M. D., Refraction, Accommodation and Mobility.

Professor Ira E. Marshall, M. D., Aural Anatomy, Physiology and Operations.

Professor Seth S. Bishop, M. D., Secretary, Clinical Pathology, Therapeutics and Operative Surgery.

ANNOUNCEMENT.

The Attending Surgeons of the Illinois Charitable Eye and Ear Infirmary will conduct consecutive monthly sessions of clinical and didactic lectures during the years of 1888-89.

The sessions will begin on September 1, 1888, and close on July 1, 1889. The schedule is so arranged that students and practitioners may enter the sessions at any time and complete the course in four weeks.

These courses are given at the Eye and Ear Infirmary, the clinical facilities of which are unequalled in the Northwest. During the year 1886 there were 4,451 patients treated in this institution, with an average of 215 treatments per diem, making a total of 67,000 treatments given during the year, with

656 surgical operations. Hence it is evident that those who are desirous of perfecting themselves in theoretical and practical ophthalmology and otology may enjoy as abundant advantages at home as it would be possible for them to utilize abroad.

In these courses the student has opportunities not only to witness the various operations on living subjects, but also to perform them on cadaverous parts.

Practical demonstrations are given in the use of all the important eye and ear instruments, including ophthalmoscopic and otoscopic examinations, enabling the student to become thoroughly practiced in the skilful manipulation of these instruments.

Numerous pathological and osteological specimens, dissectible models of the eye and ear in plaster, wax and paper; the microscope and laboratory liberally illustrate and simplify the subjects of anatomy, physiology, histology, pathology and bacteriology as relating to the eye and ear.

Refraction and accommodation are thoroughly taught, and students acquire practical experience in the art of fitting glasses.

The lectures are given daily from 3 to 4 P. M.; allowing students to witness treatments and operations during the regular clinic hour, from 2 to 3 o'clock, and to return to their respective colleges in time to attend their afternoon lectures.

Certificates are awarded after attendance upon one session.

The fee for one course is \$25.

Further information may be obtained by addressing the secretary,

SETH S. BISHOP, M. D.,

The vacancy in the chair of ophthalmology at the College of Physicians and Surgeons, caused by Dr. Agnew's death, has been filled by Dr. Hermann Knapp.

Dr. Chas. S. Bull has been appointed to the chair of ophthalmology at the University Medical College, New York.